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MOBILE FEED MILLING

by Cooperatives in the Northeast

by T. R. Eichers and A. J. Hangas

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Joseph G. Knapp, Administrator

The Farmer Cooperative Service conducts research studies and service activities of assistance to farmers in connection with cooperatives engaged in marketing farm products, purchasing farm supplies, and supplying business services. The work of the Service relates to problems of management, organization, policies, merchandising, product quality, costs, efficiency, financing, and membership.

The Service publishes the results of such studies; confers and advises with officials of farmer cooperatives; and works with educational agencies, cooperatives, and others in the dissemination of information relating to cooperative principles and practices.

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This study was conducted under authority of the Agricultural Marketing Act of 1946 (RMA, Title II).

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Summary

This study covers mobile mill services offered by 5 cooperatives—or in some cases branches of a cooperative—that were operating 12 mobile mills in Pennsylvania and New Jersey in 1958 and 1959. One association had seven branches operating eight mills; the other four associations each operated one mill. We also obtained information on time required to do the different operations in four of the mills during 1960.

The major objectives of this study were to: (1) Determine practices and policies of mobile mill operations, (2) determine costs and returns of these operations, and (3) compare efficiency of different methods of operating mobile feed mills.

The study brought out these basic facts:

Background for Operating Mobile Mills

Farmer cooperatives acquired mobile feed mills to: (1) Provide patrons with a needed service, and (2) retain or increase feed patronage.

Farmers used mobile mill service primarily because of its convenience and because it resulted in a saving of both time and cost.

The larger farmer operators who grew most of their own feed grain requirements were the most regular patrons of mobile milling service. About 80 percent of the mill patrons were dairy farmers.

Half of the patrons were located more than 10 miles from the cooperative.

Mobile Mill Equipment

All mills included in the study were factory-made units equipped with molasses tanks and pneumatic unloading systems. Seven had corn shelling attachments.

Cost of grinding and mixing units alone ranged from $12,677 to $14,295, truck costs ranged from $3,000 to $4,516, and pneumatic unloader costs ranged from $1,668 to $1,955. The corn sheller attachments cost $1,200. Cost of complete units thus ranged from $17,500 to $22,000. Most associations used a 7-year depreciation rate on the entire milling unit.

Repair costs for the 1958-59 fiscal year ranged from $370 to $2,646, and averaged $1,030 a mill.

All but one of the mills studied were of the 1-ton size and were capable of processing from 3 to 5 tons of dairy feed an hour. One mill was equipped with a 1-1/2-ton mixer.

Feed Volume and Rations

Feed volume per mill averaged 2,500 tons in 1958 and 3,313 tons in 1959. Average volume per mill increased about one-third because most of the milling operations were relatively new in 1958.

Mills operated by two men processed about 5 percent more feed than one-man mills in both 1958 and 1959.

Mobile milling volume varied considerably by season during the year. The

average mill processed nearly twice as much feed in its busiest week as it did during its lightest week. Busiest weeks were in late winter; lightest weeks were in late summer.

Dairy feed was the principal ration ground and mixed. It accounted for 78 percent of the entire volume. Ingredients in the dairy ration were: Corn 46 percent, oats 20 percent, supplement 19 percent, molasses 8 percent, barley 4 percent, hay 2 percent, and other ingredients 1 percent.

Income and Costs

Service charges ranged from $3.50 to $5 for each batch of feed weighing between 2,200 and 2,500 pounds. They averaged about $4 for a batch of 2,200 pounds, or approximately $3.63 a ton.

Income per mill from service charges and molasses margins amounted to $10,473 in 1958 and $13,563 in 1959.

Increasing the feed volume from 2,500 tons in 1958 to 3,313 tons in 1959 increased net margins from service revenue and molasses sales from $45 a mill in 1958 to $1,584 a mill in 1959.

In 1958, it cost two-man mills 85 cents more to process a ton of feed than it cost one-man mills. Cost per ton for grinding and mixing averaged $4.70 for the two-man mills and $3.85 for the one-man mills.

The cost of processing a ton of feed in all mills averaged 52 cents less in 1959 than in 1958, mostly because depreciation costs and overhead expenses were spread over a larger volume of business.

Labor was the largest single expense item—accounting for 45 percent of all expenses in 1958.

Mobile Mill Travel

Mills traveled some 50 miles daily and spent about 2 hours of each day on the road.

Mills traveled at the rate of 25 miles an hour or 2.4 minutes a mile. Rate of speed from the cooperative to the first farm in the service area averaged 2.2 minutes a mile, and speed between farms was 3.1 minutes a mile.

More than 90 percent of the mobile service was on a scheduled route basis. Travel time averaged about 10 minutes a batch of feed and cost between 75 cents and $1 a batch.

Mobile Mill Time Requirements and Relationships

The average work week for mobile mills studied was 49.4 hours in the winter and 40.3 hours in the summer.

The average time required to process a batch of dairy feed weighing about 2,200 pounds amounted to 17.8 minutes. For a batch of poultry feed weighing approximately 2,800 pounds, the average time required was 25.5 minutes.

Bulk unloading required more time than bag unloading. The four mills required 18.9 minutes to unload a batch of dairy feed in bulk, but required only 15.3 minutes to bag it off the mixer.

A two-man operation cut down the time required per batch but was less efficient in terms of total man-hours per batch or ton. Time requirements for processing a batch of dairy feed averaged 16.3 minutes for a two-man operation, 19 minutes for a single operator if the farmer helped, and 20.1 minutes if he received no help.

Mills were spending only about two-thirds of their time actually processing feed. Traveling required approximately 2.2 hours a day, or one-fourth of the mill operator's time; and miscellaneous and personal time required 0.8 hours a day, or about 10 percent of his time.

A mill operator working 10 hours a day and traveling 60 miles a day would have about 6 hours available for processing feed. In this time he could process about 21 batches (23.1 tons) of dairy feed bagged off with farmer help, or about 18 batches (19.8 tons) unloaded in bulk.

Application of Findings to a Model Mill

A model mill was developed from data in this study and a previous one in the Midwest.

One mill operator, on a full-time basis, should process 3,300 tons of feed a year. His income from grinding and mixing should total $11,550 and from molasses gross margins, $2,640. After deducting expenses of $12,925, this would leave net margins of $1,265. A mill operator and a part-time helper would have to operate at a rate equal to 120 percent of the capacity of one full-time operator to do as well. Two full-time operators would need to operate at more than 130 percent of the capacity of one full-time operator to make the same net margins.

Concluding Observations

Some of the findings from the study were as follows:

1. Mobile mills must be kept in operation substantially all of the time to be profitable.

2. Pneumatic unloading systems are slower but more flexible than other types.

3. A second man on the mobile milling operation does not increase feed output significantly.

4. Costs of processing a ton of feed are from 20 to 25 percent greater in mills with two operators than in mills with only one operator.

5. The time required for grinding and mixing a batch of feed depends to a large extent on the type of feed processed.

6. Mobile mills must rely on other income in addition to service charges to break even.

7. Mill travel must be kept to a minimum for efficient operation.

Mobile Feed Milling by Cooperatives in the Northeast

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A decade or two ago mobile feed mills came to the farm but they merely ground the farmer's feed. Now cooperative mobile feed mills provide a grinding and mixing service complete with the necessary supplements and advice on feed formulation if desired. This complete job is done in a fraction of the time required for the farmer to process his own feed or take grain to a stationary mill for processing.

Cooperative feed dealers have acquired mobile feed mills primarily because they wanted to expand or retain their feed business, and because farmers were requesting this type of service. Many others are considering purchasing mobile feed mills. Since the mobile mill represents a sizable investment and is costly to operate, the prospective operator should be assured of an adequate volume of business before acquiring the mill. He should also know the probable costs of operation to determine whether this service is likely to be profitable to the operator as well as useful to the patron.

This study was undertaken primarily to assist cooperative feed dealers who have mobile feed mills in evaluating their mobile mill operations, and to provide those considering the purchase of mobile mills with information on desirable volumes, operating data, and practices essential for success.

The more specific objectives of this study were: (1) To determine operating practices and policies of mobile mill operations; (2) to determine costs and returns of the mobile mill operations; and (3) to compare the efficiency of different methods of operating mobile feed mills.

To obtain information for this study, Farmer Cooperative Service personnel interviewed the managers of 5 cooperatives or branches, that were operating 12 mobile feed mills in Pennsylvania and New Jersey in 1959. Seven branches of one association operated 8 mills and the other 4 associations each operated 1 mill. Data obtained covered 1958 and 1959 operations. All mills were used in the analysis of operating practices, but four mills considered not typical as to volume or costs were omitted in the financial analysis and in other analyses involving volume of feed ground and mixed.

In 1960, we made a time study of four of the mills. Each mill was observed during 1 full day's operation to determine time requirements for different methods of operation and for different phases of the operation.

We believed the mills in this study were representative of those operating in the area. Financial records were fairly

complete and detailed for most mills, but some data on volume and operations had to be estimated.

This study supplements an initial one of mobile mills operating in the North Central area.[1]

Background for Operating Mobile Mills

Nearly all the associations studied entered the mobile milling business after 1957. Volume of their mills has been increasing steadily since that time. Because of the growing demand for this type of service, five associations or branches obtained a second mill after operating only a short time.

Why Cooperatives Obtained Mobile Mills

The decision to purchase a mobile mill is a difficult one. Will service to the patrons and returns from the operation offset the costs of owning and operating the mill? Managers of these mills expected they would.

These cooperatives began operating mobile mills primarily for two reasons:

1. To provide patrons with a needed service. Eight managers indicated that one of the major reasons for obtaining their mobile mills was a definite need exhibited by patrons for this type service. Most of these cooperatives did not operate stationary mills. Thus the mobile mill made it possible for the cooperative to enter the custom milling business.

2. To retain or increase feed patronage. Six managers indicated they obtained their mobile mills mostly because other feed suppliers with mobile mills were acquiring many of the cooperatives' patrons. Generally mobile mills were operated by other feed suppliers in the area before the cooperatives obtained theirs. Although there were many mobile mills operating in this area (one cooperative reported 28 or 30 mobile mills in its trade territory), feed patronage of all associations studied increased with the addition of mobile mills.

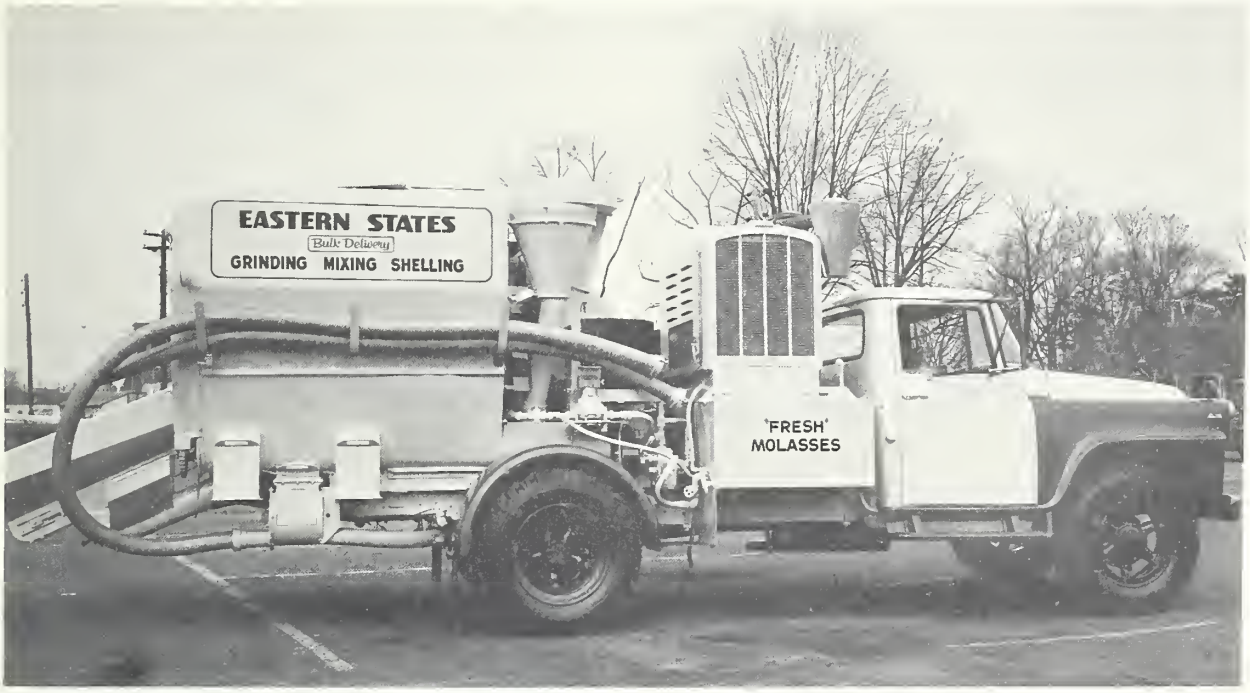
Why Farmers Used Mobile Mill Service

We asked managers why their patrons were using mobile mill services at the time of the study. Reasons given were as follows:

Reasons	Number responding
Convenience	10
Saves time and labor	9
A saving in net cost over other methods	5
Better grinding or mixing job than with farmers' own milling equipment	2
Can have molasses mixed with feed	2
Farmer knows his own grain is used in the feed	1

According to the managers interviewed, farmers used the mobile service primarily because it was convenient and saved time and labor. When farmers

[1] Hangas, Arno J. Mobile Milling by Cooperatives in Michigan and Wisconsin. FCS General Report 63, August 1959. Farmer Cooperative Service, U. S. Dept. of Agr.



This complete mobile milling unit is the type used by cooperatives included in this study.

grind and mix their own feeds, or take them to a stationary mill, as much as half a day or more may be required. With mobile milling the job can usually be finished in an hour or less.

Cost was also a factor. Nearly one-half the managers indicated that farmers considered the cost of mobile grinding and mixing to be less than the cost of grinding and mixing under methods they had been using previously.

The managers also stated that farmers in nearly all associations considered that the mixing and molasses-blending job of the mobile mill was equal or superior to that of the stationary mills.

Problems in Starting and Operating Mobile Mills

What were the major problems encountered in starting and operating the mobile milling operation? According to five managers of the cooperatives or branches studied, planning and scheduling the mill route was the major problem (table 1).

Mill operators in three other associations or branches had difficulty in getting farmers to collect their feed ingredients at a central point on the farm prior to the mill's arrival. Most mill operators considered such advance preparation necessary to minimize the number of mill moves required on the farm.

Other managers indicated they had difficulty in obtaining sufficient volume, finding good mill operators, or in convincing farmers that the quality of the grinding and mixing job of the mobile mill was equal to that of a stationary mill.

Many of the problems that faced mobile mill operators at the time the mills began operation still existed at the time this study was made. After a year or two of operation the mill operator's major problems

Table 1.--Problems encountered in operating 11 mobile milling services in Pennsylvania and New Jersey, 1958-1959

Problems encountered	Number of managers or mill operators reporting problems	
	At start of operation	At time of study
Planning and scheduling routes	5	3
Getting farmers to have grain ready	3	3
Obtaining sufficient volume	1	2
Convincing farmers mill does good job	1	0
Getting good operators	1	0
Paying operators	1	0
Servicing the mill	0	1
None	0	2

were maintaining a scheduled routing system and educating farmers to collect ingredients at a central point before the mill's arrival.

While only one association indicated it did not have a sufficient volume when it began operating, by the time this study was made two operators indicated they needed more volume, especially in the light season. This was true in spite of the fact that their feed volume had increased about one-fourth from 1958 to 1959. In other words the mills needed a larger volume of business for efficient operation than they had originally anticipated.

Characteristics of Mobile Mill Patrons

Farmers who use mobile mill service are usually the larger operators who raise most or all of their own grain requirements. They are farmers who believe they do not have time to grind and mix their own feed or take their feed to a stationary mill for processing.

Most of the farms serviced by the mobile mills in this study were dairy farms. Although only one association specifically mentioned the mills' adaptability to dairy operations, it seemed that mobile mills were well suited to this type of farm operation, since nearly 80 percent of all the feed processed in the mills was fed to dairy cattle.

Only one-fifth of all patrons of the mobile mills were poultry or hog feeders. This was true in spite of the fact that seven of the mills had corn-shelling attachments which enabled them to do a complete grinding and mixing job for such feeders.

Farmers who live farther away from a stationary mill are more likely to use mobile mill service than those living closer to the stationary mill. An earlier study in the Midwest area, showed that all of the cooperatives' stationary mill patrons were within 15 miles of the mill, while from 8 to 56 percent of the mobile mill patrons were over 15 miles from the mill.

The mobile mills did not seem well adapted to small farmers who needed less than a ton of feed per stop.

Mobile Mill Equipment

Mobile mill equipment basically consists of a feed grinder, a mixer, and a molasses tank permanently mounted on a truck chassis. Other equipment often includes a corn sheller and either an auger or a pneumatic type unloading attachment.

The annual depreciation and repair cost of this equipment amounts to about one-third of the total cost of operating the mobile mill. Therefore, the type of equipment used and the care it receives are important factors in the profitable operation of these mills.

The mobile mill backs up to the patron's barn ready to start grinding and mixing.

Equipment Used

Each of the mills studied was a complete factory-assembled grinding and mixing unit. All were powered with diesel engines. Each unit had a molasses blender and a pneumatic unloading system. Of the 12 mills, 7 had corn shellers. Truck chassis on which the mills were mounted had a rated capacity of from 2 to 3 tons.

Of all the mills 11 had 1-ton mixers (75 to 78 cu. ft.) and were capable of processing from 3 to 5 tons of dairy feed an hour.

An average batch of dairy feed for these mills weighed about 2,200 pounds. A batch of poultry or hog feed weighed 2,700 to 2,800 pounds.

One mill had a 1-1/2-ton capacity mixer or about 110 cubic feet in size. Each batch of dairy feed for this mill weighed approximately 3,000 pounds, while a batch of poultry or hog feed weighed about 4,000 pounds.

Eleven units had 16-inch hammermills, and one had a 12-inch hammermill. All units carried molasses tanks with a capacity of from 2,000 to 3,500 pounds.

Eleven of the units were purchased new within the past 3 years. The cost of these complete units ranged from $17,500 to $22,204 and averaged about $20,000. Cost of the grinding and mixing unit alone ranged from $12,677 to $14,295. Truck costs ranged from $3,000 to $4,516; pneumatic unloaders, from $1,668 to $1,955; and two corn shellers cost $1,200 each (table 2). One association had purchased a used mobile mill for $14,496 in 1955.

Most associations used a 7-year depreciation schedule on the entire unit. Those depreciating the mill and truck separately used a shorter period on the truck than on the mill—3 to 6 years on the truck and 5 to 10 years on the mills.

The complete mobile units weighed from 15,500 to 22,000 pounds when empty. The

Table 2.--Equipment costs for 12 mobile mills in Pennsylvania and New Jersey, 1958-1959

Item	Average cost	Cost range
Complete unit	$19,977	$14,496 to $22,204
Grinding and mixing unit	13,500	$12,677 to $14,295
Trucks	3,800	$3,000 to $4,516
Pneumatic unloaders	1,800	$1,668 to $1,955
Corn shellers	1,200	(1)
Annual depreciation	2,717	$1,693 to $3,355
Repair cost, 1958	1,030	$370 to $2,646

[1] Costs were available separately on only two corn shellers; each cost $1,200.

heavier units were equipped with both pneumatic unloading attachments and corn shellers. Managers did not report having difficulties because of State load limits.

All managers indicated they were satisfied with their mobile units. Several reported the mobile mills did a better molasses-blending job than stationary mills. They all thought the mill was well suited for the job. One manager who did not have a pneumatic unloader attachment on his mill believed such an attachment would increase the efficiency of the mill.

Seven managers said they had no major mechanical difficulties with the mill or the attachments during the period they had been operating it. Some managers, however, reported that the diesel engines did not have sufficient power, and this resulted in several breakdowns and high maintenance costs.

Servicing and Upkeep of Equipment

A good preventive maintenance program is essential to keep the mobile mill operating on schedule and to avoid costly breakdowns.

Mill operators in all the associations serviced trucks and mills regularly on both a daily and a weekly basis. The trucks were also serviced every 1,000 to 1,200 miles by a local service station or at the cooperative's service stop.

Nine managers reported no major mechanical difficulties with either the mill or the truck during the entire period of operating a mobile mill.

While most associations reported no major mechanical problems, repair costs seemed high. During the fiscal year 1958-1959, repair costs ranged from $370 to $2,646 a mill, and averaged $1,030. This amounted to about 41 cents a ton for all the feed ground and mixed.

Some managers indicated they preferred to have two men operating the mill because this permitted one man to spend some time in caring for the mill, thus reducing repair and upkeep costs. However, in this study repair costs averaged $1,463 in the two-man mills as compared with $770 in the one-man mills. This might be explained by the fact that two-man mills processed a greater amount of feed. However, repair costs per ton of feed mixed in the two-man mills also exceeded those of the one-man mills.

Feed Volume and Rations

Volume is essential for the profitable operation of a mobile feed mill; therefore an organization should be fairly sure of a sizable milling volume before acquiring a mobile mill.

This section of the report deals with the volumes of feed milled, types of feed mixed, and the effect of mill volume on net margins.

Volume of Feed Milled

In 1958 mills included in the study processed an average of about 10 tons of feed daily. In 1959 their daily volume increased to approximately 13 tons. The mills stopped at an average of 7 farms daily in both 1958 and 1959, and they milled about 1.5 tons a stop in 1958 and nearly 2 tons a stop in 1959.

On an annual basis, feed volume averaged some 2,500 tons a mill in 1958, but increased to 3,313 tons a mill in 1959. Individual mill volumes ranged from 1,950 tons to 3,338 tons in 1958, and from 2,875 tons to 3,960 tons in 1959 (table 3).

The 33 percent increase in average feed volume in 1959 resulted in a 42-cent-a-ton increase in net margins, over those realized in 1958.

Two-man mills processed about 5 percent more feed in both 1958 and 1959 than one-man mills.

Seasonal Effects on Feed Volume

Mobile feed mill volume varied greatly during the year. The large-volume season for the mills was the winter and spring months from November to May.

The average mill processed nearly twice as much feed and serviced nearly twice as many farmers during its high-volume week as in its low-volume week (table 4). The time required per week, however, during the slack period averaged about two-thirds as much as in the high-volume period. Thus, the time spent per ton of feed was considerably greater in the low-volume summer months than in the high-volume winter months.

This seasonal variation presents a problem in maintaining an adequate volume in the slack season and in meeting all the patron requests for service in the busy season. To some extent this problem can be overcome by using two men on the operation in the busy season and only one in the slack season.

Table 3.--Average feed volume for 12 mobile feed mills in Pennsylvania and New Jersey, 1958 and 1959

Year	Average volume in tons per year			
	One-man mills	Two-man mills	All mills	
			Average	Range
		Tons		
1958	2,458	2,572	2,500	1,950 to 3,338
1959	3,238	3,422	3,313	2,875 to 3,960

Table 4.--Seasonal variations in volume of feed processed, farms serviced, and hours worked, 12 mobile mills in Pennsylvania and New Jersey, 1958-1959

Mill code number	Heavy season	Volume processed		Farms serviced		Hours worked	
		Largest week	Smallest week	Largest week	Smallest week	Largest week	Smallest week
		Tons		Number		Hours	
1a	Dec.-May	150	75	60	35	50	39
1b	Dec.-May	125	50	50	20	50	27
2	Dec.-Feb.	85	75	35	35	50	40
3	Winter	98	60	35	20	55	30
4	Nov.-Apr.	90	70	45	39	58	45
5	Winter	67	29	64	21	58	42
6	Winter and early spring	75	30	40	22	(1)	(1)
7	Dec.-Apr.	75	45	50	35	50	32
8	Dec.-Mar.	67	29	64	21	58	42
9	Nov.-Dec.	98	20	53	15	44	20
10	Winter	42	22	23	15	48	25
11	Winter	60	30	30	20	50	35
Average per mill		86	45	46	25	52	34
				Percent			
Smallest week as a percent of largest week		--	53	--	54	--	65

[1]Data not obtained.

The seasonal mobile milling operation can be well fitted into many farm supply operations that also experience large seasonal variations in volume. The light-volume season for the supply cooperative is usually during the winter months. Therefore, personnel could be shifted from the supply store to the mill in the winter months, and back to the supply store in the summer months. This type of arrangement would be especially desirable where the mobile mill could meet the patrons' needs in the summer with only one man, but would need a second man during the winter.

Types of Feeds Mixed

Dairy feed was the principal type of feed mixed--accounting for 78 percent of the feed processed by the mobile mills. In each of the locations dairy feed volume was 50 percent or more, and in five it was 90 percent or more of the entire volume (table 5).

The major ingredient in the dairy feed was cob corn, accounting on the average for 46 percent of the dairy feed volume. Other ingredients used in the dairy feeds were: Oats 20 percent, supplement 19 percent, molasses 8 percent, barley 4 percent, hay 2 percent, and other ingredients 1 percent (table 6). A batch of dairy or beef cattle feed generally weighed about 2,200 pounds as opposed to 2,800 pounds for poultry or hog feed.

Poultry feed amounted to 11 percent of the grinding and mixing volume. Shelled

Table 5.--Proportion of different feeds mixed by 11 mobile feed milling operations in Pennsylvania and New Jersey, 1958-1959

Association or branch code number	Type of feed mixed					
	Dairy	Poultry	Hog	Beef	Other	Total
	Percent					
1	50	20	5	25	0	100
2	90	5	5	0	0	100
3	98	2	0	0	0	100
4	65	15	10	10	0	100
5	80	15	5	0	0	100
6	90	5	5	0	0	100
7	80	15	4	0	1	100
8	90	5	3	2	0	100
9	60	30	8	0	2	100
10	90	2	2	6	0	100
11	70	10	5	0	15	100
Average	78	11	5	4	2	100

corn was the major ingredient in the poultry ration, amounting to 64 percent of the total. Concentrates amounted to 28 percent, oats 4 percent, wheat 3 percent, and barley 1 percent of the poultry ration.

Only 5 percent of the feed processed was for hogs. The ingredients in the hog feed were: Shelled corn 55 percent, oats 15 percent, concentrate 15 percent, barley 11 percent, wheat 2 percent, and hay 2 percent.

Beef feed amounted to 4 percent of the grinding and mixing volume. Average proportions of different ingredients used were: Cob corn 62 percent, oats 12 percent, concentrates 12 percent, barley 8 percent, and molasses 6 percent.

Nutritional Assistance

Patron requests for nutritional assistance from the mill operator varied greatly among the mills. In seven associations or branches 10 percent or fewer of the patrons asked for nutritional help from the operator. In the other four, the managers indicated that from 40 to 90 percent of the patrons wanted advice on formulating their rations (table 7).

Table 6.--Ingredients used in rations mixed by 11 mobile feed milling operations in Pennsylvania and New Jersey, 1958-1959

Type of ration	Feed ingredients								
	Corn	Oats	Barley	Wheat	Hay	Concentrates	Molasses	Other	Total
	Percent								
Dairy	46	20	4	0	2	19	8	1	100
Poultry	64	4	1	3	0	28	0	0	100
Hog	55	15	11	2	2	15	0	0	100
Beef	62	12	8	0	0	12	6	0	100

All but two associations said that mill operators suggested rations for dairy cattle, hogs, or poultry when asked to do so. When operators did not have the time, or could not help the patrons, they referred them to someone else in the organization who could assist them.

While many mill operators gave nutritional advice in the first year of operation, most of them did not find it necessary to continue once the patron had a satisfactory formula.

All managers considered their concentrate program adequate to meet the patrons' nutritional needs.

Table 7.--Proportion of patrons who asked for nutritional advice from the operator in 11 mobile feed milling operations in Pennsylvania and New Jersey, 1958-1959

Percent of patrons who asked for advice on formulas	Number of branches or associations
90	1
50	2
40	1
10	3
Less than 5	4

Income and Costs

Service charges and gross margins on ingredients constitute the income of the mobile mill. Income from these sources should at least cover expenses involved in the mobile mill operation.

At the service rates usually charged, mobile mills will not break even on service income alone. Thus the volume of concentrates and ingredients moved through the mill is important and the mobile mill, in reality, becomes a method of merchandising feed.

This section of the report deals with the income, or receipts, and costs of mobile mill operations and the factors that affect them. It does not cover merchandising aspects of such mills.

Service Charges

All but 1 of the 11 associations or branches charged for grinding and mixing service on a batch basis. Basic rates ranged from $3.10 to $4.50 a batch in nine of the group operating mills with 1-ton mixers and charging by the batch (table 8). Five of the nine had a basic charge of $4 a batch. Average size batches ranged from 2,000 to 2,500 pounds.

One association with a mill equipped with a 1-1/2-ton mixer charged $5 a batch. Another association operating a 1-ton mill charged on a time basis—at 30 cents a minute.

All but two associations or branches varied the base rate for the type of grind, number of batches ground and mixed, and for other factors. The most common reason for varying rates was the type of grind—whether coarse ground for dairy or beef cattle, or finer ground for poultry or hogs. In four cases, where no shelling was involved, the difference ranged from 50 cents to $1 a batch. In three operations, where the corn was also shelled in grinding poultry or hog feed, the differential between dairy grind and poultry grind ranged from $1 to $1.90 a batch and took care of both the shelling and the finer grind.

Four associations or branches granted discounts if more than one batch was mixed. Two gave a 50-cent discount on the second

Table 8.--Rates charged for grinding and mixing by 11 mobile feed milling operations in Pennsylvania and New Jersey, 1958-1959

Association code	Base rate per batch, bagged or bulk			Additional charge if				Discount given for		Average size batch
	Grinding and mixing		Grinding, mixing, and shelling	Hog or poultry grind	Corn to be shelled (cwt.)	Patron does not help	Association's concentrates are not used	Bulk unloading	Additional batches	
	Any grind	Dairy grind								
	Amount per batch									Pounds
1	$3.50	--	$5.25	--	--	--	--	--	(1)	2,500
2	5.00	--	--	$0.50	--	--	--	$1.00	--	3,000
3	4.50	--	--	--	--	--	$0.50	--	(2)	2,300
4	4.00	--	--	--	--	--	--	--	--	2,000
5	4.00	--	5.00	--	--	--	--	--	(2)	2,300
6	4.00	--	--	0.50	--	--	--	--	--	2,400
7	(4)	--	--	--	(4)	--	--	--	--	2,400
8	4.00	--	--	--	--	--	--	--	--	2,000
9	--	$3.10	5.00	0.90	--	$0.50	--	--	--	2,300
10	--	4.50	--	1.00	$0.10	--	--	--	(3)	2,200
11	4.00	--	--	--	0.15	--	--	--	--	2,200

[1]Discount of 50 cents a batch for two to four batches and $1 for five or more batches of dairy grind.
[2]Discount of 50 cents a batch for two or more batches.
[3]Discount of 50 cents for second batch and $1 for three or more batches.
[4]This association charged by the minute - 25 cents a minute in 1958 and 30 cents a minute in 1959.

and all succeeding batches. One gave a 50-cent discount on the second, third, and fourth batches, and a $1 discount for each succeeding batch. Another association gave a 50-cent discount on the second batch and a $1 discount on all succeeding batches.

One association charged 50 cents extra a batch if the patrons did not help the mill operator, and another charged 50 cents extra if the association's concentrate was not used. Only one association granted a discount for unloading in bulk—$1 a ton.

Six associations or branches had mills equipped with shellers. Rates for straight shelling were based either on a rate per minute or per hundredweight. Three charged 25 cents a minute; one, 30 cents a minute; one, 10 cents a hundred pounds; and one, 15 cents a hundred pounds of corn shelled.

Three mills quoted separate hay grinding rates, each on a different basis—25 cents a minute, 20 cents a hundred pounds, and $8 a ton.

Each organization had a minimum charge for processing a batch, regardless of the size. This usually was also the minimum charge per farm; it ranged from $1 to $4 with an average of $2.75 a batch.

Credit Terms

Although most mobile mill patrons paid cash, all mills offered credit terms. These terms usually ranged from 10 to 30 days.

Here the mill operator adds cob corn to the hay being fed into the mobile mill feeder conveyor.

About one-half of the mills operated primarily on a cash basis. Six associations or branches conducted 85 percent or more of their mobile milling business on a cash basis. Some operators indicated this was not too difficult because farmers were accustomed to paying cash for custom work.

Nine associations or branches gave a cash discount to mobile mill patrons. Eight gave a 1 percent discount and one gave a 2 percent discount. This no doubt helped in obtaining a cash payment. Only one mill charged interest, which was at the rate of 6 percent a year, after 60 days.

Payment of Mill Operators

Most mill operators received a straight weekly or hourly salary with time and one-half for overtime (table 9). Overtime was anything over 40 or 44 hours a week. All operators of the one-man mills were paid a straight salary with no commission. In two of the six two-man mills, operators received a commission in addition to their regular salary.

None of the organizations paid mill operators commissions on molasses sales or incentive payments for obtaining new patrons.

Several managers indicated they preferred to pay mill operators straight salaries rather than commissions because they feared commission operators might neglect the care of their equipment in a desire to increase volume. The methods of payment used were reported to be satisfactory to both the operators and the cooperatives.

Table 9.--Methods of compensating operators and helpers in 11 mobile feed milling operations, Pennsylvania and New Jersey, 1958-1959

Type of pay plan	One-man operations	Two-man operations	Total
		Number	
Hourly wage, no commission	0	1	1
Weekly wage, no commission	5	3	8
Weekly wage plus commission	0	2	2
Total number	5	6	11

Operating Results

This section shows incomes, expenses, and net margins of eight mobile mills for their 1958 and 1959 operating years. Four mills were omitted because their data were not comparable, or they did not operate the full period.

Income, Costs, and Net Margins

In 1959 the eight mills included in the financial analysis processed an average of 3,313 tons of feed. At a charge of about $3.45 a ton, this provided a service income of $11,477 a mill (table 10).

Table 10.--Average income and costs per mill for eight mobile milling operations in Pennsylvania and New Jersey, 1958 and 1959

Item	All mills		One-man mills		Two-man mills	
	1958	1959	1958	1959	1958	1959
Income:						
Service revenue	$ 8,725	$11,477	$8,308	$10,661	$ 9,420	$12,465
Molasses gross margins	1,748	2,086	1,255	1,994	2,571	2,451
Total	10,473	13,563	9,563	12,655	11,991	14,916
Costs:						
Labor	4,677	5,878	3,735	4,695	6,227	7,118
Other expenses	5,751	6,101	5,695	5,719	5,843	6,822
Total	10,428	11,979	9,430	10,414	12,070	13,940
Net margins:						
Total	45	1,584	133	2,241	-79	976
From service revenue only	-1,703	-502	-1,122	-247	-2,650	-1,475
Number of mills	8	8	5	4	3	4
Feed volume (tons)	2,500	3,313	2,458	3,238	2,572	3,422

In addition to the service income, these mills realized gross margins of $2,086 from the sale of molasses. Thus, on the average, total revenue per mill from service charges and molasses margins amounted to $13,563 in 1959.

Gross margins on other concentrate ingredients were not included as income to the mills in this study. Inclusion of such margins would be justifiable; but if this were done, then expenses of handling them also should be considered.

Average total expenses amounted to $11,979 in 1959. Of this $5,878 or nearly one-half was labor. Other expenses amounted to $6,101 a mill.

The mills suffered an average loss of $502 using service income as the only income credited to the mill. However, when molasses margins were included as income the mills realized an average net margin of $1,584.

Income and Costs per Ton of Feed Processed

Income from service charges and molasses gross margins amounted to $4.19 a ton in 1958, and $4.09 a ton in 1959 (table 11). Thus, gross receipts per ton of feed processed were 10 cents less in 1959 than in 1958.

The cost of processing a ton of feed was $3.65 in 1959 compared with $4.17 a

Table 11.--Average income and cost per ton for processing feed by eight mobile milling operations in Pennsylvania and New Jersey, 1958 and 1959

Item	All mills		One-man mills		Two-man mills	
	1958	1959	1958	1959	1958	1959
Income:						
Service revenue	$3.49	$3.46	$3.38	$3.30	$3.66	$3.64
Molasses gross margins	.70	.63	.51	.62	1.00	.72
Total income	4.19	4.09	3.89	3.92	4.66	4.36
Costs:						
Labor	1.87	1.77	1.52	1.45	2.42	2.08
Other expense	2.30	1.88	2.33	1.78	2.28	1.98
Total expense	4.17	3.65	3.85	3.23	4.70	4.06
Net margins:						
Total	.02	.44	.04	.69	-.04	.30
From service revenue only	-.68	-.19	-.47	-.07	-1.04	-.42
Number of mills	8	8	5	4	3	4
Feed volume (tons)	2,500	3,313	2,458	3,238	2,572	3,422

Table 12.--Detailed operating costs per mill and per ton of feed ground and mixed by eight mobile milling operations in Pennsylvania and New Jersey, 1958

Item	Total cost per mill			Cost per ton			Percent of cost		
	All mills	One-man	Two-man	All mills	One-man	Two-man	All mills	One-man	Two-man
Operating costs:									
Labor	$ 4,677	$3,735	$ 6,227	$1.88	$1.52	$2.42	45	40	52
Depreciation	2,721	2,898	2,416	1.09	1.19	.95	26	31	20
Repairs and upkeep	1,030	770	1,463	.41	.31	.57	10	8	12
Gas, oil and fuel	1,232	1,239	1,221	.49	.50	.47	12	13	10
Insurance	136	163	97	.05	.07	.04	1	2	1
License	137	135	141	.05	.06	.05	1	1	1
Interest	495	490	505	.20	.20	.20	5	5	4
Total	10,428	9,430	12,070	4.17	3.85	4.70	100	100	100
Number of mills	8	5	3	--	--	--	--	--	--
Feed volume (tons)	2,500	2,458	2,572	--	--	--	--	--	--

ton in 1958. Most of the 52-cent reduction was obtained by spreading depreciation and overhead expenses over a larger volume of business. Costs other than labor were 20 percent less in 1959 than in 1958 ($1.88 a ton in 1959 vs. $2.30 a ton in 1958). The labor cost a ton was about 5 percent less in 1959 than in 1958.

Net margins were 44 cents a ton in 1959 compared with 2 cents in 1958. This improvement appeared to be entirely the result of reduced operating costs resulting from increased volume because gross income per ton was 10 cents less in 1959 than in 1958.

On the average, service charges amounted to $3.46 a ton of feed processed and molasses margins amounted to 63 cents a ton of feed processed in 1959. Service charges accounted for 85 percent of the mill income and molasses margins accounted for 15 percent.

Labor was the largest single cost item in 1958, accounting for 45 percent of all expenses (table 12). Depreciation amounted to 26 percent; repairs and upkeep, 10 percent; gas, oil, and fuel, 12 percent; license and insurance, 2 percent; and interest, 5 percent.

Relation of Volume to Returns

A sizable volume is needed if the mill is to operate on a profitable basis. In 1959, most mills were operating at or near capacity and most realized a net margin above expenses when molasses margins were considered as income to the mill. In 1958, however, several mills were not operating at capacity. Two processed less than 2,000 tons of feed. Each suffered a

A batch of feed has been ground and mixed and is now being unloaded into the patron's bulk bin.

loss of over $2,000 that year, even after crediting molasses gross margins as income to the mill.

In 1958 the mills studied had an average feed volume of 2,500 tons. Service income in 1958 lacked $1,703 of covering the cost of operating these mills (table 10). Adding molasses margins to the mill income resulted in a net margin of only $45 per mill (table 10).

By 1959 the mills had increased their average volume to 3,313 tons. With molasses margins included as income, net margin rose to $1,584 a mill (table 10). Thus, increasing average mill volume by about 800 tons resulted in raising net margins by some $1,500.

Further information on relation of volume to returns and costs are covered in succeeding sections, including one dealing with the model mill, beginning on page 31.

Effects of One-Man and Two-Man Operations

In 1958, five of the eight mills included in the financial analysis were one-man operations, and three were two-man operations. The next year four were one-man mills, and four were two-man mills. In each of the 2 years the two-man mills processed about 5 percent more feed than the one-man mills, but their gross income was 18 to 25 percent greater because of higher service charges and molasses margins (table 10).

Expenses of the two-man mills, however, exceeded those of the one-man mills by 27 percent in 1958 and 34 percent in 1959. As a result, net margins of the one-man mills were more than twice as much as those of the two-man mills in 1959 ($2,241 for one-man mills and $976 for two-man mills, table 10). In 1958, one-man mills realized a small net margin while two-man mills showed a slight loss.

A breakdown of expenses in 1958 showed that it cost the two-man mills $4.70 to process a ton of feed, but it cost the one-man mills only $3.85 a ton (table 12). This difference was entirely a result of higher labor costs in the two-man mills; other costs were slightly lower in the two-man mills. Labor costs amounted to $2.42 a ton in the two-man mills and only $1.52 a ton in the one-man mills—a difference of 90 cents a ton, or 59 percent, in favor of the one-man mills.

Mobile Mill Travel

Travel time and cost are very important in the efficient operation of a mobile mill. The use of scheduled routes and distances traveled are discussed in this section.

Routing

A definite routing system is essential to keep travel at a minimum and to assure regular service to patrons. About 92 percent of the patrons of mobile mills in this study were serviced on scheduled routes, the range being from 75 to 100 percent among the mills (table 13).

All associations attempted to operate regular routes, but this was sometimes difficult because patrons wanted the mill at some specified time. Some operators found it necessary to continually sell patrons on the need for a routing system.

Routes were usually set up by dividing the cooperative's trade area into several sections and servicing each section every week or every 2 weeks. Several associations had mobile mill patrons plotted on a map that was divided into the areas serviced each day. Such a map not only assisted in setting up a routing system but showed the cooperative where the business might be expanded.

About 8 percent of the patrons were serviced on an order basis. Special orders were usually serviced off the regular route as soon as the mill arrived in the area.

Table 13.--Proportion of patrons obtaining mobile mill service on order and on scheduled route basis, 11 mobile milling operations in Pennsylvania and New Jersey, 1959

Association code	Proportion of farmers serviced on:		Proportion of farmers on a route basis serviced:		
	Order basis	Route basis	Weekly	Biweekly	Monthly
			Percent		
1	5	95	75	25	0
2	0	100	0	100	0
3	10	90	100	0	0
4	25	75	65	35	0
5	2	98	3	85	12
6	5	95	0	100	0
7	10	90	40	60	0
8	3	97	0	75	25
9	10	90	20	80	0
10	5	95	15	85	0
11	10	90	8	90	2
Average	8	92	30	66	4

Area Served and Distance Traveled

On the average, 50 percent of the mobile mill patrons were located more than 10 miles, and 28 percent more than 15 miles, from the association or branch headquarters (figure 1).

Only two of the associations or branches operated stationary mills; therefore, no comparison could be made between the location of mobile mill patrons and those of stationary mills. An earlier study in the Midwest, however, showed that where an association operated both a mobile and a stationary mill, the mobile mill patrons generally were located farther from cooperative headquarters than patrons of the stationary mill. The Midwest study showed that nearly all patrons using the stationary mills lived within 15 miles of the mill, while 8 to 56 percent of the mobile mill patrons lived more than 15 miles from the mill's base.

Distance driven each year ranged from 7,200 to 15,000 miles a mill. However, 10 of the 12 mills each traveled from 11,500 to 15,400 miles annually. Daily mileage ranged from 30 to 60 miles a mill. Nine of the mills each traveled between 45 and 64 miles daily (table 14).

Table 14.--Distance traveled by 12 mobile mills in Pennsylvania and New Jersey, 1959

Average distance traveled	Number of mills	Percent of total
Miles per day		
25-34	2	17
35-44	1	8
45-54	4	33
55-64	5	42
Total	12	100
Miles per year		
Less than 11,500	2	17
11,500-12,400	3	25
12,500-13,400	1	8
13,500-14,400	2	17
14,500-15,400	4	33
Total	12	100

Mobile Mill Time Requirements and Relationships

The time required in performing the various operations is one of the most important factors affecting the efficiency and profitableness of a mobile milling operation. This section considers the time required in the different activities and some of the main factors affecting time requirements in mobile milling. Then it gives results of a detailed study made of time requirements in four of the mills during their busy season.

Activities Performed in a Work Week

A work week for the 12 mobile mills in this study averaged about 49 hours in the large-volume winter season and 40 hours in the low-volume summer season (table 15). Mill operators worked approximately 4 hours a week in the warehouse during the summer, in addition to operating the 12 mills. In the winter they averaged about 5 hours overtime a week and devoted practically all their time to the mobile mill.

Activities performed in the work week were divided into eight groups: (1) Working in the office, setting up the next day's route, summarizing the day's operation, and loading the truck; (2) traveling; (3) making arrangements with farmers as to the type of feed to mix and where to locate ingredients; (4) writing a service slip and

Figure 1

PROPORTION OF MOBILE MILL PATRONS LOCATED AT VARIOUS DISTANCES FROM COOPERATIVE HEADQUARTERS, 11 ASSOCIATIONS IN PENNSYLVANIA AND NEW JERSEY, 1959

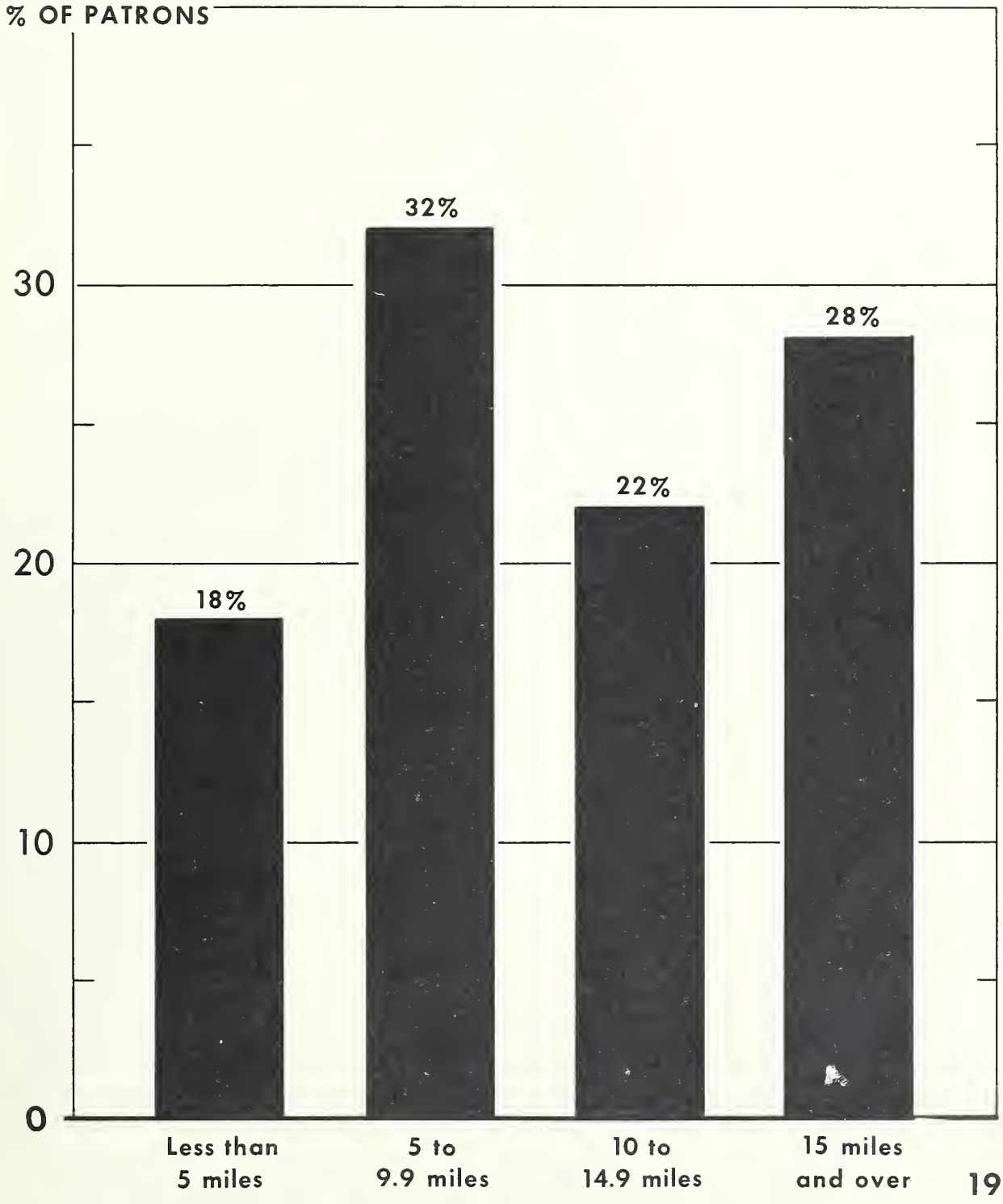


Table 15.--Estimated time devoted per week to various activities by 12 mobile milling operators in Pennsylvania and New Jersey, 1959

Description of activity	Time spent during:		Percent of total mobile milling time spent in:	
	Busy season	Light season	Busy season	Light season
	Hours		Percent	
In office and loading	3.1	2.8	6.3	6.9
Traveling	13.1	11.2	26.5	27.8
Making arrangements with patrons	.7	.7	1.4	1.7
Collecting accounts	1.5	1.2	3.0	3.0
Discussing rations	.5	.6	1.0	1.5
Grinding and mixing feed	27.8	20.7	56.3	51.4
Servicing equipment	2.4	2.5	4.9	6.2
Explaining service	.3	.6	.6	1.5
Subtotal	49.4	40.3	100.0	100.0
Working in warehouse	.3	4.0	--	--
Total	49.7	44.3	--	--

collecting accounts; (5) discussing rations with farmers; (6) actually grinding and mixing feed; (7) servicing equipment; and (8) explaining the service to patrons.

Mill operators estimated that they spent slightly more than one-half their time in processing feed (56 percent in winter and 51 percent in summer). They believed that about 27 or 28 percent of their time was spent in traveling, and from 15 to 20 percent in all the other activities listed.

Detailed Study of Daily Time Requirements

We observed four of the mobile feed mills, each for a full day—to obtain detailed time requirements for various operations. We studied these mills in the spring of 1960, before feed volume had dropped for the season.

Some variation might have existed in the performance of the mill operators on the day their activities were studied, as compared with their performance on other days. Their production, however, was about the same as the average of all 12 mill operations during their highest volume week in the spring of 1959. For example, each of the four mills served an average of 9.5 farms and processed 18 tons of feed a day compared with an average of 9 farms and 17 tons a day for the 12 mills.

Each of the mills was mounted on a 2- to 3-ton truck. Each mill had a 16-inch hammermill, a 75-cubic foot mixer, and a pneumatic unloader.

Two of the mills were operated by two men and two mills had only one operator each. Farmer help was expected in the one-man mills, but not all farmers helped. Nearly all farmers had collected ingredients at a central point before the arrival of the mill. About one-half of the feed was unloaded in bulk.

Of the feed processed, 70 percent was dairy feed and 22 percent was poultry feed. The remainder (8 percent) was beef and hog feed (table 16). The major feed ingredients were corn, oats, and concentrates.

Table 16.--Characteristics of mobile milling operations observed in 1 day's time study of each of four mills in Pennsylvania and New Jersey, 1960

Mill number	Number of operators	Farms served	Batches processed	Time mill was away from headquarters	Type of feed mixed		
					Dairy	Poultry	Other
				Hours	Percent		
1	2	6	16	9.5	45	45	10
2	2	11	22	9.2	60	33	7
3	1	7	8	6.0	85	0	15
4	1	14	20[1]	9.7	90	10	0
Total	6	38	66	34.4	--	--	--
Average	1.5	9.5	16.5	8.6	70	22	8

[1]Eight were only partial batches.

During the 4 days of observation (1 day for each mill), the four mills mixed 66 batches of feed for 38 farmers.

Use of Time in 1 Day's Work

The four mills were on the job an average of 8.6 hours a day. Three mills were in the country for more than 9 hours, while one was out only 6 hours.

Of the 8.6 hours they spent away from the cooperative, 5.6 hours—or 65 percent of the time—was on farms; 2.2 hours—or 24.5 percent of the time—was in travel; and 0.8 hours—or 10.5 percent of the time—was in miscellaneous and personal activities (table 17).

Time Required to Process a Batch of Feed

The time required to process a batch of feed depends on the type of feed mixed, the number of mill operators, the amount of farmer assistance, the arrangements on the farm, and other factors.

Table 17.--Time spent in various activities during 1 day by four mobile milling operations in Pennsylvania and New Jersey, 1960

Mill number	Hours spent per day				Percent of time spent			
	Processing	Traveling	Other activities[1]	Total	Processing	Traveling	Other activities[1]	Total
	Hours				Percent			
1	5.7	3.3	0.5	9.5	60	35	5	100
2	7.1	1.5	0.6	9.2	77	16	7	100
3	3.7	0.8	1.5	6.0	62	13	25	100
4	5.9	3.3	0.5	9.7	61	34	5	100
Average	5.6	2.2	0.8	8.6	65	24.5	10.5	100

[1]Writing service slips, collecting, discussing rations, explaining the service, and personal.

In the 4 mills we saw process 66 batches of feed, the time required to process a batch weighing about 2,200 pounds averaged 20.5 minutes (table 18). The range for individual operators was from 11 to 33 minutes. Of this time, 9.2 minutes—or 45 percent—was spent actually grinding and mixing, 6.6 minutes—or 32 percent—was spent in unloading, 0.9 minutes—or 4 percent—was spent in moving, and 19 percent was spent in miscellaneous activities.

Cost of processing a batch of feed was almost directly proportional to the amount of time consumed. This means that the cost of processing the most time-consuming batch was about three times as great as for the least time-consuming batch. However, the charge for the large time-consuming batch was only 25 percent greater than for the low time-consuming batch ($5 instead of $4).

In addition to the average of 20.5 minutes actually spent in processing a batch of feed, collecting time required 1.8 minutes a batch, personal time amounted to 4 minutes a batch, and travel time amounted to 8.2 minutes a batch. Total time required on all operations thus averaged 34.5 minutes a batch. At this rate, a mill could process 16 batches of feed in a 9-hour day.

Effect of Selected Factors on Processing Time

Some of the procedures and activities that affected processing time follow:

Type of Feed Milled. - The average time required to process a batch of dairy, poultry, and hog feed was as follows:

Type of Feed	Minutes per batch
Dairy	17.8
Poultry	25.5
Hog	24.0

Poultry and hog feed required more time for grinding and mixing than dairy feed because: (1) They were more finely ground, (2) corn usually had to be shelled, (3) a heavier batch was mixed, and (4)

Table 18.--Time spent per batch of feed in performing various activities by four mobile milling operations, Pennsylvania and New Jersey, 1960

Mill number	Mill operators	Activity of mill operator								
		Grinding and mixing	Unloading	Moving on farm	Miscellaneous	Subtotal	Collecting[1]	Personal	Travel	Total
	Number	Minutes								
1	2	9.1	6.4	1.2	3.7	20.4	1.2	1.6	12.6	35.8
2	2	8.8	5.8	1.2	2.2	18.0	1.2	1.6	4.1	24.9
3	1	9.3	7.3	1.2	6.5	24.3	2.7	11.2	6.0	44.2
4[2]	1	9.5	6.7	(3)	2.9	19.1	2.3	1.5	10.0	32.9
Average	1.5	9.2	6.6	0.9	3.8	20.5	1.8	4.0	8.2	34.5
Percent		45	32	4	19					

[1]Includes writing service slips and collecting.
[2]Includes only 12 complete batches.
[3]Less than 0.1.

Table 19.--Time requirements per batch in processing feed with different methods of unloading, four mobile operations in Pennsylvania and New Jersey, 1960[1]

Type of processing activity	Bagged unloading			Bulk unloading		
	Dairy	Poultry	Average	Dairy	Poultry	Average
	Minutes per batch					
Grinding and mixing	7.9	12.5	10.2	7.9	12.5	10.2
Unloading	5.1	4.9	5.0	7.3	9.7	8.5
Miscellaneous	2.3	4.0	3.2	3.7	6.3	5.0
Total	15.3	21.4	18.4	18.9	28.5	23.7
Percent that bulk time exceeded bagged time	--	--	--	24	33	29
Batches analyzed	23	12	--	6	9	--

[1]Only complete batches considered.

poultry feeds were usually unloaded pneumatically in bulk into distant bins.

Unloading Methods. - The method of unloading had a significant effect on the amount of time required to process a batch of feed. Bulk unloading with the pneumatic unloaders on these units required considerably more time than bag unloading.

The total time required to process a batch of dairy feed was 18.9 minutes when feed was unloaded in bulk and only 15.3 minutes when feed was bagged off the mixer (table 19). Total processing time, therefore, was 3.6 minutes—or 24 percent—more when feed was unloaded in bulk than when it was bagged off. A batch of poultry feed required 33 percent more time when unloaded in bulk than when it was bagged off.

Actual unloading time for dairy feed when unloaded in bulk was 7.3 minutes a batch and 5.1 minutes when bagged. Bulk unloading of poultry feed required 9.7 minutes a batch, or about twice as much as the 4.9 minutes required when poultry feed was bagged. Miscellaneous activities also took longer for bulk unloading for both dairy and poultry feeds.

The actual time required to unload a batch of poultry feed ranged from 7.4 to 15.9 minutes a batch when unloaded in bulk, but from only 3.5 minutes to 7.8 minutes when bagged off.

Pneumatic unloading of poultry feed under conditions observed in these four milling operations required nearly twice as much time as bag unloading. In most cases, though, when poultry feed was unloaded with a pneumatic system, it was also transferred a considerable distance to a bulk bin. When elevated or transferred only a few feet, pneumatic unloading required little more time than bagging off.

While pneumatic unloading required more time than bag unloading, it did eliminate the need for a second man in unloading. It also gave the mill operator a rest period, which might be essential since feeding the machine by hand is hard physical work. Bulk unloading may also make the job of operating a mill more attractive and, therefore, easier to obtain and keep help. The pneumatic unloader also performed an additional function in transferring feed to bins which were otherwise difficult or impossible to reach. When feed was bagged off, operators usually moved

the bags only as far as needed to get them out of their way. It still remained for the patrons to move them closer to the point of use.

According to some sources, pneumatic unloaders are available which do unload in less time than the type observed in this study and, perhaps, in less time than is required for bag unloading.

Both farmer help and the use of a second mill operator contributed more to the operation when feed was bagged than when it was unloaded in bulk. This will be discussed in succeeding sections.

Number of Mill Operators. - Whether to use one or two men in operating a mobile feed mill is a question faced by many mill owners. On the basis of possible daily volume it seems questionable whether using a second man is normally profitable.

In our time study of the four mills, the actual time spent in processing a batch of dairy feed was 3.8 minutes less in the two-man mills than in the one-man mills (16.3 minutes versus 20.1 minutes, table 20), Total labor time, however, was 62 percent more—32.6 for the two-man mills (16.3 minutes each for 2 men), and 20.1 minutes for the one-man mills. Labor time in

Table 20.--Time required per batch in processing dairy feed, four mobile milling operations, Pennsylvania and New Jersey, 1960[1]

Activity	Two men--without farmer help	One man	
		With farmer help	Without farmer help
		Minutes	
Bag unloading			
Grinding and mixing	7.2	9.5	9.7
Bag unloading	4.4	6.2	7.6
Other activities on the farm[2]	3.1	2.1	2.6
Total	14.7	17.8	19.9
Saving over one operator without help	5.2	2.1	--
Bulk unloading			
Grinding and mixing	7.2	9.5	9.7
Bulk unloading	7.2	7.2	7.2
Other activities on the farm[2]	3.4	3.4	3.4
Total	17.8	20.1	20.3
Saving over one operator without help	2.5	0.2	--
Combination			
Grinding and mixing	7.2	9.5	9.7
Unloading	5.8	6.7	7.4
Other activities on the farm[2]	3.3	2.8	3.0
Total	16.3	19.0	20.1
Saving over one operator without help	3.8	1.1	--

[1]Thirty-eight complete batches analyzed. Two-man operations processed 22 batches and one-man operations processed 16 batches.

[2]Includes time spent in preparing the mill for operation and in moving on the farm but does not include time spent in traveling between farms or personal time on the farm.

waiting, moving the mill on the farm, and the like was double the lapsed time because in these activities the second man could not contribute anything to reduce the time required in processing feed.

In processing dairy feed a two-man operation saved 5.2 minutes a batch when feed was unloaded in bags but only 2.5 minutes when it was unloaded in bulk. But in terms of man labor actually used, the two-man operations required 48 percent more labor when the feed was bagged off and 75 percent more when unloaded in bulk. In 5 hours of grinding and mixing time, a two-man operation could process only about two batches more than a one-man operated unit.

When grinding and mixing poultry feed, there was almost no difference in the lapsed time required for one-man and two-man operations. Therefore labor time was nearly twice as great in the two-man operations.

Whether to use a second man would depend on several factors. Among the most important are the method of unloading, amount of patron assistance available, advance arrangements made by patrons before arrival of the mill, and time required for travel.

A helper can speed up the operation when feed is to be bagged. A second man can also be helpful if the patron is not available to help or does not have all the ingredients ready where the feed is to be mixed. The time required in travel is also a factor to consider in deciding whether to operate with one or two men. The second man can contribute nothing while the mill is traveling. The greater the distance to be traveled, the less the second man can contribute in speeding up the operation.

Normally it would seem that a second man would not be justified purely on a profit and loss basis. He would be justified only if the one operator could not handle the necessary feed volume in a reasonable number of hours.

While these observations seem to indicate that a second man may not be required except in the larger operations, several justifications for a second man do exist:

1. It may be easier to obtain help to operate the mill, since each man will need to work less if there are two operators. Also during the busy seasons the job may be physically too exhausting for one man.

2. With two men, the operator should have time to do a better job of caring for the mill. He could also have more time to work with farmers on collection, nutritional assistance, and promotion of mobile mill services. The availability of the additional time, however, will not automatically assure that the time will necessarily be devoted to these activities.

3. Farmer assistance is not needed with two men, although the time-study findings indicated this assistance may not be necessary even in one-man operations.

Some mills used two men throughout the year; some used only one man throughout the year. Others used two men during the busy winter season and one man during the light summer season. The latter method seems worth considering. In many mills operated by two men throughout the year, the second man is actually needed only during the busy season from about November to May. During the slack summer and fall season this second man may not be needed on the mill.

To obtain a man to work on the mill for only the 6 busy months might be difficult. The slack season for the mill, however, is normally the busy season for the

cooperative. Where this is so, the second man could readily be transferred from the mill to the cooperative's sales room or warehouse in summer and back to the mill in winter.

A problem may arise in deciding when to add a second man to the mill or when to take him off. The operator may wish to keep the helper throughout the year. The manager must then decide with tact when the second man is needed and when he is not needed.

Amount of Patron Assistance. - Some farmers in each association assisted the mill operator, especially in the one-man operations. Farmer help usually involved feeding ingredients into the mill, or removing bags of mixed feed from the mill. From 45 to 98 percent of the farmers helped the operator when the mill was operated by one man, while only 5 to 50 percent helped when mills were operated by two men (table 21). This help did not reduce the time required for grinding and mixing significantly, but did help reduce the time required to bag feed off.

Managers differed as to the value of farmer help. The manager of one association, with one man operating its mill, thought that farmer help saved the mill operator as much as 20 hours a week. Two associations that had two men operating their mills indicated that farmer help did not save the mill operators any time.

Most associations with one-man operations requested that farmers assist the mill operator, and one association made an additional charge if the farmer did not help.

The time study of the two one-man mills showed that farmers' assistance contributed the most time—or reduced the time required to process a batch of dairy feed most—when the feed was unloaded in bags. Under these conditions, the farmer's assistance reduced the time required per

Table 21.--Help contributed by patrons in one-man and two-man operated mills in 11 cooperative mobile feed milling operations in Pennsylvania and New Jersey, 1958-1959

Association or branch code number	Number of mills	Number of operators per mill	Percent of farmers who helped mill operators	Hours contributed by patrons per week
2-man mills:				
1	2	2	25	0
2	1	2	10	4
3	1	2	5	0
4	1	2	50	5
6	1	2	5	0
11	1	2	50	12
Average	-	2	24	3.5
1-man mills:				
5	1	1	80	20
7	1	1	98	11
8	1	1	75	3
9	1	1	60	7
10	1	1	45	2
Average	-	1	72	9
All mills average	-	-	46	5.8

batch by 2.1 minutes—or 10 percent—from 19.9 minutes a batch when farmers did not help to 17.8 minutes when they did help (table 20).

Farmers' assistance had almost no effect on the time required per batch when feed was unloaded in bulk. Under these conditions, farmer help reduced the time required by only 0.2 minutes a batch, or about 1 percent. When a combination of bag and bulk unloading was practiced, the saving by farmer help was 1.1 minutes a batch.

Locating Ingredients to Minimize Mill Moving. - Nearly all associations requested that patrons gather the feed ingredients at one point to avoid moving the mill during the grinding and mixing operations. In all but one association, 75 percent or more of the farmers did this. Yet in some cases, because farmers did not do so, the mills had to be moved as many as nine times on one farm.

All managers were of the opinion that advance arrangements by patrons to help avoid moving the mill on the farm saved the mill operator a considerable amount of time. One manager indicated that this practice saved the mill operator 50 hours a week or the equivalent of one good man. Other managers said such advance arrangements by patrons saved the mill operators from 4 to 40 or 50 hours a week. The average saving was estimated at about 21 hours a week.

Mill Travel Time

Area to be covered, distance to be traveled, and time consumed in travel are important factors to consider in operating a mobile mill. Travel time accounted for about one-fourth of the total time of all the mills included in the study. On some days, however, a few of the mills spent as much as 50 percent of their time in traveling.

This mobile mill operator has ground and mixed the patron's feed and is bagging it here.

This large amount of travel time is significant for several reasons: It limits the amount of time available to process feed, it increases the cost of feed processing, and it reduces the usefulness of a second man in a two-man operation.

In the time study of four mobile mill operations, each observed for an entire operating day, travel averaged nearly 60 miles a day and required 2.2 hours daily (table 22). The average speed for all travel was about 25 miles an hour or 2.4 minutes a mile.

The cost of mill travel calculated at 15 cents a mile for the truck and $1.80 an hour for the operator amounted to $1.08 a batch of feed mixed in the two-man mills and $0.74 a batch in the one-man mills.

Time in travel in this study was divided into two categories: (1) Time spent in

Table 22.--Time spent in all travel during 1 day's operation, four mobile milling operations, Pennsylvania and New Jersey, 1960

Association or branch number	Number of farms	Miles traveled		Time traveled		Average speed	
		Total	Average per farm	Total	Minutes per farm	Miles per hour	Minutes per mile
		Miles		Hours	Minutes	Miles	Minutes
1	6	104	17.3	3.3	33	31.5	1.9
2	11	33	3.0	1.5	8	22.0	2.7
3	7	19	2.7	.8	7	23.8	2.5
4	14	73	5.2	3.3	14	22.1	2.7
Total	38	229	--	8.9	--	--	--
Average	9.5	57	7.0	2.2	16	24.8	2.4

travel from the cooperative headquarters to the service area (the community where the farmers to be serviced were concentrated), and (2) time in travel between farms.

Travel to and from the service area in four associations studied was at the rate of 2.2 minutes a mile, or 27 miles an hour. At this rate if the area to be serviced is 10 miles from the cooperative, the total time required to get to the first farm and return from the last farm served would be about 44 minutes. If the farmers to be serviced were 20 miles from the cooperative, approximately 90 minutes would be spent in traveling to and returning from the service area. These figures are illustrated in the accompanying tabulation.

Distance to service area (miles)	Time required one way (minutes)	Time required round trip (minutes)
5	11	22
10	22	44
20	44	88
30	66	132

Travel between farms was at the rate of 3.1 minutes a mile—a considerably slower rate than travel from the cooperative to the service area. The rate of travel between farms depends to some extent on the distance between farms. For distances of less than one mile the speed was about 7 minutes a mile. When distance between farms was more than 2 miles the rate of travel was 2.6 minutes a mile.

Table 23 shows the time required to travel the various distances between

Table 23.--Calculated travel time per day between farms based on the number of farms visited and average distance between farms[1]

Average distance in miles between farms	Time required to visit the following number of farms:[2]				
	1	5	10	15	20
Miles	Minutes				
0.5	3.0	15.0	30.0	45.0	60.0
1.0	4.1	20.5	41.0	61.5	82.0
1.5	5.2	26.0	52.0	78.0	104.0
2.0	6.3	31.5	63.0	94.5	126.0
3.0	8.5	42.5	85.0	127.5	170.0

[1] Travel time for distances of less than 0.5 miles calculated at 6 minutes per mile and for distances greater than 0.5 miles at 2.2 minutes a mile.

[2] Does not include time required to travel from the cooperative to first farm or to return to cooperative from last farm.

farms. About 1 hour a day would be spent in traveling between farms if a mill serviced 10 farms located about 2 miles apart or 15 farms located 1 mile apart.

Time Required for Other Activities

Activities, other than travel and feed processing, that require the time of mill operators consisted of writing out service slips and collecting accounts, discussing rations with farmers, explaining the service to patrons, and personal activities such as lunch and rest periods.

The time spent on other activities in the four operations studied ranged from 0.5 to 1.5 hours and averaged 0.8 hours during an 8.6-hour work day. This represented from 5 to 25 percent of the entire work day, or an average of 10.5 percent.

The accompanying tabulation based on the time study data shows the amount of time which may be spent in other activities during work days of varying lengths.

Item	Length of work day in hours			
	6	8	10	12
	Hours			
Lunch and other personal time[1]	0.9	1.0	1.1	1.2
Collecting time	0.4	0.5	0.6	0.7
Total	1.3	1.5	1.7	1.9

[1]Other personal time calculated at 5 percent of total time.

Time Available for Feed Processing

Based on the foregoing data on time requirements for various activities, the amount of time available for processing feed in work days of varying length and travel distances is shown in table 24. For example, in an 8-hour day a mill traveling 60 miles would have only 4.1 hours available for feed processing, because 2.4 hours would be required for travel and 1.5 hours would be spent in personal activities and collecting accounts.

This table indicates that when considerable travel is required on a day's route, a rather long day is necessary if any volume of feed is to be processed. A mill traveling 60 miles in a 6-hour work day would have only 2.3 hours in which to grind and mix feed. On the other hand, a mill traveling 60 miles in a 10-hour work day could process feed for 5.9 hours. In the first case, the mill would be processing feed only 38 percent of the time; in the second, it would be processing feed 59 percent of the time. By putting in 10 hours rather than 6, the mill could process 2-1/2 times as much feed.

Batches Possible in Specified Time Periods

After determining the approximate amount of time available for feed processing, the mill operator can estimate the approximate number of batches that he can process in a work day of given length. Table 25 shows the approximate number of batches that can be processed in 2, 4, 6, or 8 hours of actual grinding and mixing time.

In 6 hours of grinding and mixing time, a two-man crew could process about 24.6 batches of dairy feed if all feed is bagged off. During this time they could process only 12.6 or about one-half as many batches of poultry feed if the corn had to be shelled and all poultry feed was unloaded in bulk.

Tables 24 and 25 can be combined to estimate the approximate number of batches a mill operator can expect to process in a 6-, 8-, or 10-hour day depending on the distance traveled and the type of feed mixed. For example; if a mill

Table 24.--Estimated time available for processing feed in work days of varying length and travel distances

Distance traveled	6-hour day			8-hour day			10-hour day		
	Collection and personal time[1]	Travel time	Time available for feed processing	Collection and personal time[1]	Travel time	Time available for feed processing	Collection and personal time[1]	Travel time	Time available for feed processing
Miles		Hours			Hours			Hours	
20	1.3	0.9	3.8	1.5	0.9	5.6	1.7	0.9	7.4
40	1.3	1.7	3.0	1.5	1.7	4.8	1.7	1.7	6.6
60	1.3	2.4	2.3	1.5	2.4	4.1	1.7	2.4	5.9
80	1.3	2.9	1.8	1.5	2.9	3.6	1.7	2.9	5.4
100	1.3	3.3	1.4	1.5	3.3	3.2	1.7	3.3	5.0

[1]Collecting accounts usually runs about one-third of the time in this column.

Table 25.--Batches of dairy and poultry feed which can be processed in a given number of hours[1]

Type of feed, operation, and method of unloading	Hours of actual grinding and mixing			
	2	4	6	8
	Number of batches processed			
Dairy feed:				
Two-man operation without farmer help:				
Bag unloading	8.2	16.4	24.6	32.8
Bulk unloading	6.8	13.6	20.4	27.2
One-man operation with farmer help:				
Bag unloading	6.8	13.6	20.4	27.2
Bulk unloading	6.0	12.0	18.0	24.0
One-man operation without farmer help:				
Bag unloading	6.0	12.0	18.0	24.0
Bulk unloading	5.9	11.8	17.7	23.6
Poultry feed:				
Two-man operation without farmer help:				
Including corn shelling:				
Bag unloading	5.6	11.2	16.8	22.4
Bulk unloading	4.2	8.4	12.6	16.8
Not including corn shelling:				
Bag unloading	7.4	14.8	22.2	29.6
Bulk unloading	5.3	10.6	15.9	21.2

[1]Based on four mobile milling operations in Pennsylvania and New Jersey, 1960.

operator on a one-man operation puts in a 10-hour work day and travels 60 miles he would have 5.9 hours available for grinding and mixing feed (table 24). Then according to table 25, in 6 hours he could process 20.4 batches, (22.4 tons) of dairy feed with farmer help if all the feed was bagged off. Or he could process 18 batches, (19.8 tons) of dairy feed if all feed was unloaded in bulk.

Application of Findings to a Model Mill

On-the-farm grinding and mixing of feed by means of complete mobile feed mills is increasing in areas growing feed grains and feeding livestock. But feed dealers considering the acquisition of mobile mills have little information on the practical daily output of these mills or the cost involved in operating them.

To assist cooperatives and other feed dealers in determining the feasibility of a mobile feed milling operation, Farmer Cooperative Service developed a mobile mill model showing costs and returns when operating at different volume levels and with either one or two men operating the mill. The model is based on information from the mobile feed milling operations included in this report and from similar operations in Michigan and Wisconsin studied in 1958.

Operating Assumptions

Equipment

- 75-cubic foot mixer (capacity of 2,200 lbs. of dairy feed or 2,800 lbs. of poultry feed)
- 16-inch hammermill
- Corn sheller
- Pneumatic unloader
- Equipment operated by 100 hp. diesel engine
- Unit mounted on 2-ton truck chassis
- Maximum output—about 5 tons an hour of dairy feed

Operation

- Volume - 80 percent dairy feed and 20 percent poultry or hog feed
- Unloading - 50 percent with blower and 50 percent bagged off
- Patron help - Patrons have ingredients ready at one location and help in one-man mill operation
- Travel - 50 to 60 miles a day
- Batches mixed - average of 1-1/2 a farm

Level of Output

- One operator alone, full time - 3,300 tons a year
- Operator and part-time helper - 3,630, or 3,960, tons a year
- Two operators, full time - 3,630, 3,960, or 4,290 tons a year

Income Rates	Amount per ton of feed processed
Grinding and mixing revenue	$3.50
Molasses gross margin (50¢ per 100 lbs. of molasses; used at rate of 5 percent of dairy feed)	.80
Total income from grinding and mixing service and molasses margins[1]	$4.30

[1] Margins on feed ingredients other than molasses were not included as income to the mill. The mill owner may be justified in crediting margins on other feed ingredients used to mobile mill income, but if this were done the costs of handling such ingredients would also have to be considered.

Expense Rates	Amount per year
Fixed expenses:	
Depreciation ($21,000 - over 7 years)	$3,000
Interest (5 percent of average investment)	525
License, taxes, and insurance	475
Total fixed expenses	$4,000
Semi-fixed expenses (labor including payroll costs):	
Operator ($85 a week)	$4,800
Part-time helper ($75 a week)	2,100
Full-time helper ($75 a week)	4,200
	Amount per ton of feed processed
Variable expenses:	
Gas and oil	$0.75
Repair and upkeep	.50
Total variable expenses	$1.25

Operating Performance

Using the foregoing assumptions, table 26 indicates the performance that might be expected of a mobile mill operating at various levels of capacity with different amounts of labor. For example, one man operating full time could process 3,300 tons of feed annually under normal conditions. We have considered this volume as 100 percent of capacity for a one-man operation, although it could be higher under unusually favorable conditions.

At a volume of 3,300 tons annually, total income from grinding, mixing, and molasses margins would yield $14,190. Of this, $11,550 would be from grinding and mixing charges and $2,640 from molasses margins. A one-man operation with a helper and a 10 percent higher output would process 3,630 tons and its total income would be $15,609.

Expenses for the one-man operation at 100 percent of capacity would total $12,925. With a one-man operation and a helper, and processing 10 percent more feed, total expenses would amount to $15,437.

Net income with a one-man operation at full capacity would amount to $1,265 with molasses margins included as income to the mill. With a one-man operation and a helper at the 110 percent level, net margins from grinding and mixing fees and the molasses would total only $172.

A mill with two full-time operators would have to work at a capacity equivalent to 130 percent of one full-time man to break even. This requires a volume of nearly 4,300 tons a year. While total income of $18,447 would be realized, total expenses would offset it.

Grinding and mixing income alone was not sufficient to cover expenses in any of the labor combinations shown in table 26. From the projections shown in the model, it can be seen that the mobile mill owner must ordinarily rely on margins from the sale of molasses if the mill is to be a profitable venture. With molasses margins included as income, a one-man operation at 100 percent of capacity (processing 3,300 tons annually) could net about $1,265 annually. With a full two-man operation it would be necessary to process some 5,000 tons a year to do as well.

Figure 2 shows graphically the income and cost data used in the model. This

Table 26.--Income and expense model of mobile feed mill operated by one man and by one man with a part-time or full-time helper

Item	One man working at following percentages of normal capacity		One man and a part-time helper working at following percentage of the normal capacity of one full-time operator[1]		Two men (full time) working at following percentages of the normal capacity of one full-time operator		
	75	100	110	120	110	120	130
				Tons			
Volume processed[2]	2,475	3,300	3,630	3,960	3,630	3,960	4,290
				Dollars			
Income:							
Grinding and mixing[3]	8,662	11,550	12,705	13,860	12,705	13,860	15,015
Molasses margin[4]	1,980	2,640	2,904	3,168	2,904	3,168	3,432
Total	10,642	14,190	15,609	17,028	15,609	17,028	18,447
Expenses:							
Fixed[5]	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Semifixed (labor)[6]	4,200	4,800	6,900	6,900	9,000	9,000	9,000
Variable[7]	3,094	4,125	4,537	4,950	4,537	4,950	5,362
Total	11,294	12,925	15,437	15,850	17,537	17,950	18,362
Net margins:							
Total	-652	1,265	172	1,178	-1,928	-922	85
From grinding and mixing only[8]	-2,632	-1,375	-2,732	-1,990	-4,832	-4,090	-3,347
Income per ton:							
Grinding and mixing	3.50	3.50	3.50	3.50	3.50	3.50	3.50
Molasses margins	.80	.80	.80	.80	.80	.80	.80
Total	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Expenses per ton:							
Fixed	1.62	1.21	1.10	1.01	1.10	1.01	.93
Semifixed (labor)	1.70	1.45	1.90	1.74	2.47	2.27	2.10
Variable	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Total	4.57	3.91	4.25	4.00	4.82	4.53	4.28
Net margin per ton:							
Total	-0.27	0.39	0.05	0.30	-1.32	-1.03	-0.78
From grinding and mixing only[8]	-1.07	-0.41	-0.75	-0.50	-0.52	-0.23	0.02

[1]Two men during the 6 busiest months and one man during the 6 slowest months.
[2]Volume in associations studied in 1959 was about 10 percent greater in two-man mills than in one-man mills.
[3]Calculated at $3.50 a ton.
[4]Dairy feeds were considered 80 percent of feed volume; 5 percent molasses was estimated for the dairy feeds; a markup of $20 a ton of molasses was used.
[5]Depreciation charge of $3,000 annually ($21,000 investment depreciated over a 7-year period); interest at 5 percent of average investment was $525; and other overhead expenses were estimated at $475 annually.
[6]Calculated at $4,800 for operator and $4,200 for helper.
[7]Gas and oil costs were estimated at 75 cents a ton, and repair and upkeep costs at 50 cents a ton of feed processed.
[8]Does not exclude expenses applicable to handling molasses and other ingredients.

Figure 2

INCOME AND EXPENSE MODEL OF A MOBILE FEED MILL OPERATED BY ONE MAN OR TWO MEN

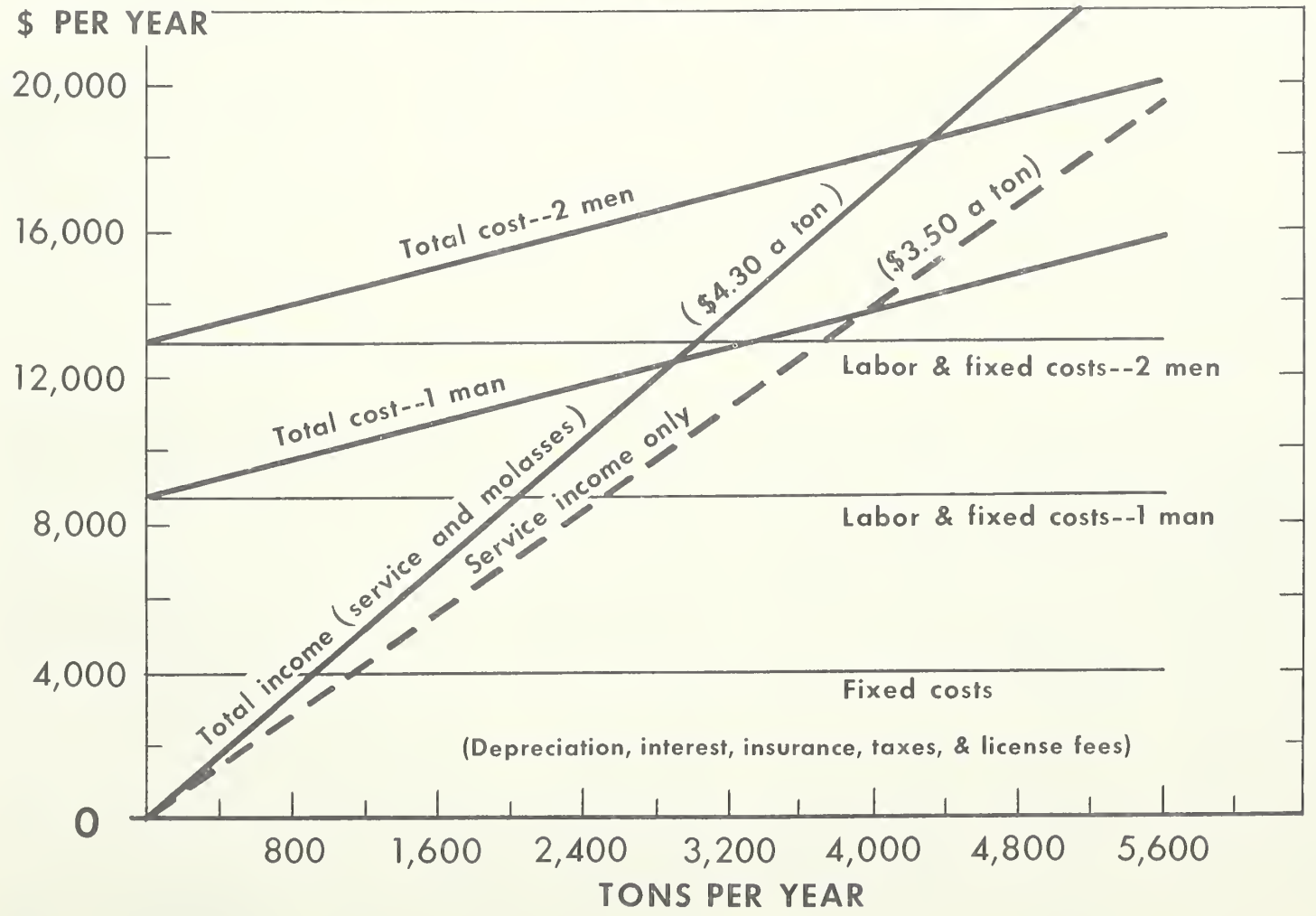


chart shows two income lines: One line indicates grinding and mixing or service income only; the other shows the combined income from service charges and molasses gross margins. The chart also shows cost lines for a one-man operation and a two-man operation.

The points at which income and cost lines cross are the break-even points, or points at which income equals expenses. For example, in the one-man operation, the service and molasses income line crosses the total cost line at about 2,900 tons a year. At this point costs and income are equal at approximately $12,400. To cover expenses with a $3.50-a-ton service income alone, it would be necessary for a one-man mill to process about 3,900 tons of feed a year. This would be a considerably higher volume than was attained by any of the operations included in this study.

A two-man operation must process about 4,300 tons of feed a year if services and molasses income are to cover expenses, and it would not be possible to meet operating expenses out of the service income alone within any reasonably attainable annual volume. An additional volume of some 1,400 tons a year is needed to pay for the cost of adding a second man on a full-time basis. An extra 700 tons is needed to pay for a second man for only one-half of the year.

The mobile mill, having finished grinding and mixing one patron's feed, moves on to the next farm.

Concluding Observations

Based on operations of the 12 mills in this study, the following observations may be made:

1. Mobile mills must be kept in operation substantially all of the time to be profitable. Expenses exceeded income from service charges and molasses gross margins in all mills with a volume of less than 2,400 tons annually. Increasing feed volume per mill from an average of 2,500 tons in 1958 to 3,313 tons in 1959 reduced operating costs by $0.52 a ton of feed processed—or 14 percent—and increased net margins from 2 cents to 44 cents a ton, or from $45 to $1,584 a mill.

2. Pneumatic unloading systems were slower but more flexible than other types. Pneumatic systems required more time than auger-type conveyors for unloading in bulk and more time than bagging feed off the mixer. However, their flexibility, made it possible to unload feed into bins which were otherwise difficult or impossible to reach.

3. A second man on the mobile milling operation did not increase feed output significantly. Although two men could process a batch of feed in 20 percent less time than one man, daily output for two-man mills was less than 10 percent greater than for one-man mills.

4. Costs of processing a ton of feed were from 20 to 25 percent greater in mills with two operators than in mills with only one operator. An additional volume of about 700 tons a year is needed to pay for the cost of adding a second man for one-half of the year, and an extra 1,400 tons is needed to pay for a second man on a full-time basis.

5. The time required for grinding and mixing a batch of feed depends to a large extent on the type of feed processed. Grinding and mixing a batch of poultry feed (including shelling corn) required from 40 to 50 percent more time than processing a batch of dairy feed. The additional time was needed for shelling, finer grinding, and often for blowing the finished feed considerable distances to bulk bins.

6. Mobile mills must rely on income other than that from service charges to break even. One-man operated mills would need to process about 3,900 tons of feed annually to break even with income from service charges, if no margins were available from molasses sales. The operator would need to process 2,900 tons to break even with income from both service charges and molasses margins. Two-man mills would require some 5,400 tons annually to break even without molasses margins and 4,300 tons to break even with such margins. None of the mills broke even without income from molasses sales.

7. Mill travel must be kept to a minimum for efficient operation. This can be done by carefully planning and scheduling routes and getting the cooperation of patrons in taking service on this basis.

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